

**Landfill Reuse:
Notes on an Engineering Forum
Roundtable Discussion ¹
U.S. EPA Technical Support Project Meeting
Orleans Hotel
Las Vegas, Nevada
October 28, 1999
Chet Janowski, Robert Stamnes,
Frank Vavra, JoAnn Cola², Camille Hueni²**

WELCOME

Frank Vavra, moderator, welcomed everyone to the Roundtable discussions on landfill reuse. The U.S. Environmental Protection Agency (EPA) is interested in addressing the need to redevelop landfills to beneficial use. Toward this end, the purpose of the Roundtable is to provide a general overview for EPA regional project managers on the progress that has been made in landfill reuse and related issues. The roundtable was structured so that panelists provided an overview of their expertise and case studies of sites, including successes and failures. The overview was followed by a question and answer period to discuss general issues related to landfill reuse, specifically in the areas of best use, potential use, ecological development, regulatory issues and hurdles, and unique design issues. Each of the roundtable panelists, represented various government agencies and private industry and had extensive and varied experiences in landfill reuse issues. The members of the panel were:

Andrea McLaughlin, EPA Office of Environmental Remediation and Response (OERR)
Sidney Wolf, EMS, Inc.
Joe King, Marasco Newton Group
Russell Mechem, EPA, Region 9
David J. Daddario, North American Realty Advisory Services
Kathryn A. Snider, Floyd and Snider, Inc.
Ron Terrel, Prof. Emeritus, U. of Washington (Civil Engineering), Terrel Research
Beth Gross, Geosyntec
Steve Dwyer, Sandia National Laboratories
Paul Schumann, Los Alamos National Laboratory
Lisa Boynton, EPA Office of Environmental Remediation and Response (OERR)

¹This Roundtable discussion is the fourth in a series of Roundtable discussions. Notes are available at the website: <http://www.epa.gov/tio/tsp/engforum.htm> .

²Engineering Forum Co-Chairs

[See *Attachment A* for a complete list of participants' contact information]

PANELIST PRESENTATIONS

Andrea McLaughlin (EPA OERR) discussed a recently available fact sheet, and others under development by the Office of Emergency and Remedial Response (OERR), regarding reuse. *Reuse of CERCLA Landfill and Containment Sites* (EPA 540-F-99-015; OSWER 9375.2-05P), completed in September 1999, is available at the OERR website <http://www.epa.gov/oerrpage/superfund>, under "Publications". This fact sheet, started prior to the Superfund Reuse Initiative, highlights nine sites where Project Managers have implemented reuse.

Three types of uses were identified in the fact sheet: ecological reuse, recreational reuse, and industrial/commercial reuse. The publication focuses on design considerations for reuse, including cap design and integrity, runoff collection systems, monitoring well location and design, leachate and gas collection systems, and vegetation choices. Other general information is provided for considerations regarding institutional controls; operation and maintenance; and tools to facilitate reuse, such as prospective purchaser agreements, partial deletions, comfort/status letters, and also limits to betterment.

Design guides are also in development for specific uses, such as athletic fields, commercial/light industrial, ecological reuse, parking lots, and golf courses, with more engineering details and references provided. Again these design guides are based on information from Superfund site examples. These guides will undergo draft reviews after completion; target dates for completion are not known at this point. Ms. McLaughlin concluded with the introduction of the next two presentations, highlighting three of these draft guides, and asked that anyone having recommendations for other reuse guides contact her at OERR.

Sid Wolf (EMS, Inc.) discussed two design guides that EMS, Inc. and OERR are developing to address landfill design considerations for *commercial reuse* sites and for *ecological reuse*. These guides are designed to provide information primarily to site managers, state hazardous waste management officials, developers, and stakeholders of all types on what technical accomplishments have been made which could facilitate commercial or ecological reuse at a site. Each guide addresses the following three general areas: 1) remedy selection options, including typical Superfund considerations such as treatment vs. containment, cap design, leachate collection systems, runoff management, but from a development perspective; 2) specific design factors for developers to consider, including institutional controls requirements, and 3) a small section on planning. [Note: EPA is developing a more comprehensive guidance to specifically address planning.] If future reuse is known early in the site management process, and a developer or community has stepped forward and is putting up the resources toward reuse, then that site can be more efficiently remediated toward that goal. If there is not a specific reuse, the RPM can assume one or remediate a site to give potential developers the flexibility for reuse. The RPM should take steps to involve the local communities, city government, and potential developers in the site remediation process. An important part of these guides is that they provide examples of successfully completed projects (at both Superfund and non-Superfund sites), along with references and contact information.

For the design guide for commercial reuse, OERR has reviewed over 150 sites that are at, or approaching, full reuse, with a range of commercial activities already in place at about half of those sites. Reuse includes office buildings, restaurants, shopping centers, airports, and a range of light to heavy industry, including a port facility in Los Angeles. This guide will include some major design considerations that a commercial developer would want to address: subsidence and differential settlement, and examples of creative solutions for each of those issues; foundations and footings; utility tunnels and access, transportation access; construction of buffer zones over landfill caps; placement of pilings through a cap; placement and configuration of monitoring wells; and consideration of flexible institutional controls.

Case Study: The Ohio River Park Superfund site, a 32-acre site on Neville Island near Pittsburgh, was redeveloped and is now the home of a world-class ice skating rink. A football stadium-sized indoor athletic field is also planned for this site.

Joe King (Marasco Newton Group) discussed another guide in the OERR design series that is being developed specifically to address athletic field reuse at containment sites. EPA recognizes that many landfill or containment sites may be suitable for recreational development. This particular guide will provide engineering considerations for developing landfill cover systems that meld cover system design to support athletic fields, with considerations for drainage and settlement. The guide will also discuss redevelopment successes, and failures at Superfund sites, such as those attributable to subsidence, landfill gas buildup, or substandard covers that were not designed to accommodate playing fields. Topics covered in the guide include: 1) site stability; 2) solutions for differential settlement through the use of geo grids in the cap sub-base; 3) phased landfill development (which is used when settlement cannot be predicted due to unknown waste type) 4) regionally-based criteria for selecting top soil and turf grass; 5) preparing a protective layer of the cap to serve as a sub-base for a sports field which considers drainage; and 6) selecting a barrier layer, such as geomembranes. The guide also provides information on alternative irrigation systems, including how to calculate what of water is needed for irrigation; drainage mechanisms to consider; specifications for sports fields; institutional controls; and operation and maintenance considerations.

Case studies will also be included in the guide describing successful cap designs for athletic fields such as Chisman Creek, a 13-acre Superfund landfill site in Virginia, which was formerly a fly ash dump and is now home to a soccer field. The guide will be available by December 1999, pending internal reviews.

Russell Mechem (EPA Region 9) provided a Case Study of Operating Industries, Inc. (OII), a public landfill and Superfund site, located 10 miles east of Los Angeles, California. The site operated as an active landfill from 1948 to 1984, at which time it was listed on the NPL. The EPA has identified approximately 4,000 potentially responsible parties (PRPs) at this time: 200 are major parties, 1,800 are *diminimis* parties, and 2000 *dimicromis* parties.

The site is one of the most complicated nation-wide from a technical, legal, and institutional standpoint. The OII site has multiple contaminant pathways, extensive leachate and landfill gas, and mounded groundwater contamination extending in four directions. The site consists of four operable units, with phased site redevelopment and remediation based on risk, resulting in layers of concurrent activities. There are multiple enforcement actions ongoing: EPA has completed six consent decrees, with a seventh

underway. The seventh consent decree will be the mechanism to combine all the institutional controls necessary for redevelopment; there will be numerous signatories to the decree.

The site consists of a north and south parcel, and, from an institutional standpoint, is very complex. OII is located on the boundary of two different cities, Monterey Park and Montebello; it overlaps two different congressional districts; and the Pomona Freeway runs through the center of the site. The south parcel is 145 acres in size and contains a mound of waste 275 feet high with a slope of 38 degrees, with resulting seismic issues to consider. The waste pile consists of 38 million cubic yards of solid waste and 330 million gallons of liquid industrial waste. The landfill gas is being collected at a rate of 2,500 cfm [A new gas header has recently come on line, increasing gas collection rates to 5,800 cfm, with more gas wells coming on line soon.] The landfill gases were detected in the houses south of the landfill, as well as the leachate, which was collecting in those backyards. On the south parcel, EPA is constructing a mono-cover (experimental design), which is nearly completed.

In contrast, the north parcel is 45 acres in size, contains very little waste, is level, and at one time was considered for delisting. It is this north parcel that has been targeted for redevelopment. The City of Monterey Park, and their Congressman, were persistent in lobbying EPA to develop the north parcel and as a result, a redevelopment effort is underway. The redevelopment plan calls for a commercial retail center that will include a Home Depot, Target, and possibly restaurants and movie theaters. From a developer's perspective, there are great benefits regarding this site: 1) Location - the site is adjacent to a freeway, resulting in commercial visibility; 1) Accessibility - there are three points of access from existing roads. However, redevelopment negotiations have been complex, and have involved the City of Monterey Park, two Real Estate developers (one of who has offered to undertake remediation at the site in exchange for control of the property), the property owner/operator, a steering committee comprised of the major PRPs, State regulatory agencies, and adjacent landowners permitting increased access. There are some particular design issues associated with this site. The leachate treatment plant, which will treat 25,000 gallons of leachate per day, and a landfill gas thermal destruction unit are located on the north parcel. The developers are working on a design solution which will incorporate these systems into the planned reuse. The only waste on the north parcel is located in the western portion, which is planned as a parking lot.

Project successes have included:

1) Expedited remediation and redevelopment of a very complex site under the innovative Superfund Redevelopment Initiative; 2) Construction is underway and approaching completion, resulting in a win/win for impacted stakeholders and economic redevelopment; 3) Implemented state of the art technologies and accelerated remedies; 4) Successfully negotiated multiple enforcement actions, including one which supported the terms of redevelopment (institutional controls); 5) Collaborative partnerships were formed between the developers, the City of Monterey Park, the regulators, the PRPs, and the impacted community - A new way of doing business; 6) Prime real estate was put back into reuse, resulting in an economic win for the City and the community.

In summary, these are the *lessons learned* for closing an environmental site when redevelopment is expected:

1) Have a clear alignment of the goals of the project, for both remediation and economic development;
2) Adopt a collaborative approach with stakeholders, including the regulated community;

- 3) Focus on expedited scheduling and construction (developers work on short time frames); Incorporate design-built concepts early in the process to expedite construction;.
- 4) Ensure open and timely communications among all parties; and
- 5) Most importantly, understand the different *processes* at work: EPA/Regulatory vs. Economic/Redevelopment vs. Real Estate/Development (expedited time frames).

David Daddario (North American Realty Advisory Services (NARAS)) discussed his company's approach to marketing distressed environmental sites for redevelopment, and offered a developer's perspective for Superfund and Brownfield Project Managers to consider when considering property for reuse. NARAS has completed projects at 1000 sites to date, operating with an experienced team of planners, engineers, market researchers, financial packages, and project managers. Their services are typically sought by corporations and municipalities, who wish to turn distressed properties to beneficial reuse. Mr. Daddario continued in offering a word of caution to Superfund Project Managers who may be asked to put significant efforts into recycling Superfund or Brownfield sites, thereby creating community expectations for reuse, when in fact resources may be lacking. Before proceeding to redevelopment, a Remedial Project Manager (RPM) should be able answer two questions:

- 1) Who is behind the property development? Have they ever done anything like this before?
- 2) Most importantly, what is the market for this type of reuse? Look for an answer beyond, for example, "industrial." A developer should be able to give you a marketing report, a plan for what will be done at the site, and an idea of what they will need to accomplish this plan (engineering details, etc.)

NARAS has used a "Use-Base Approach" since 1982 to ensure successful redevelopment of distressed properties. These questions are addressed before pursuing redevelopment:

- 1) What is the market? Identify the market for reuse up-front.
- 2) Does the site physically make sense? Remember this is a real estate transaction. Look at utilities, zoning, access issues.
- 3) Does this make sense financially? Can the development team demonstrate continued financial viability for the project? Before you invest time, you need to know if the proposed reuse will really happen.
- 4) Is the reuse compatible with environmental constraints?
- 5) Is the project politically realistic? Be aware that sometimes politics can take over a project, and the market is forgotten. When this happens, the project invariably fails.

Case Study: The MGP (Manufacturing Gas Plant) site is on an 11-acre parcel in an economically depressed section of Washington, D.C. The parcel was attractive to developers because of its relatively large size. In looking at the marketing possibilities for this property, NARAS learned that the Navy was interested in expanding its operation (the Navy owned the adjacent property) and identified a need for a private sector office development. Hence, NARAS was able to *identify an end user* (Naval contractors), *a demand* or need for additional office space, and *understood* how reuse would relate to *the neighboring community*. NARAS was able to develop a plan that provided an office and hotel complex to service Navy contractors reporting to the base, and initiated community outreach for that plan. EPA Region 3 was engaged early on and a schedule developed based on financing and real estate time frames. Adhering to these time frames is critical in packaging and implementing real estate redevelopment (*"Time kills deals!"*). Working closely with the regulators was also a key to the success of this project, resulting in quick turnaround times for workplans and other submittals. The project was

structured as a *land lease* in order to ensure strong institutional controls, and put out to bid as a real estate proposal. Lincoln Property, a nationally known land developer, was chosen to develop the project.

Case Study: Eastern Diversified Metals, located in Hometown, Pennsylvania, is a site that contains 20 acres of wire insulation called “fluff.” NARAS had a clear understanding of what the market would bear in that area because of involvement in a nearby community, and knowledge of which companies would be best in rural Pennsylvania. They looked at a number of remediation options with the PRPs, researched the market opportunities, and opted for a *revitalization effort* at the site. Basically there were two options: 1) off-site disposal (“remove the mountain of material”); or 2) in-place closure (“leave the mountain and develop around it”). Off-site disposal would have resulted in increased traffic for this small rural community, higher costs, and would have left a site poorly suited for development. NARAS opted for a *revitalization effort*, choosing in-place closure by moving in clean material. This approach produced much less traffic and resulted in cheaper, faster remediation with reuse benefits for the community. And again, we looked at the community and the elements surrounding the site to guide our reuse plan. To the west of the site is state game land, which is heavily wooded and would be greatly enhanced with additional open grasslands. The nearby low-density residential community would benefit from the addition of a light industrial area. The resulting revitalization project, which is currently in progress, will include a 20-acre habitat area and a 6-acre light industrial area. The industrial center will incorporate a 80,000 square feet building with the potential for 100 new jobs, taxes for the community, and a viable new property. At this site, as with all sites, it was important to determine who the end user would be. In summary, NARAS was able to “nicely scale the project to the community needs” for habitat revitalization and economic improvement.

Case Study: The Pennsylvania Electric site is a 10-acre, coal-fired electric generating facility located in Erie, Pennsylvania. The site was in a small community, with weak market opportunities. Properties near the site were contaminated and abandoned. Immediately adjacent property had been taken over by the city because they were in arrears in taxes. We therefore sought alternative markets, such as recreational reuse, for the parcel. It came to our attention that the *Brig Niagara*, a tall ship, was being rehabilitated nearby. We saw this as an opportunity and arranged to relocate the ship near the site as a tourist attraction. The plan was presented to the public. There were twenty eight different transactions that took place, including negotiating institutional controls. The generating equipment was left in place as part of the new museum; the stack was turned into a lighthouse. We were therefore able to save existing structures from demolition, effectively using them as tax write-offs and to enhance the project. Some areas were encapsulated and turned into parking levels, incorporating design with marketing. The site is open to the public today. It is important to remember that a remediation plan has to work in concert with the marketing plan if the redevelopment is to be successful. And that even in weak markets, there are still many viable sources for funding.

Kate Snider (Floyd & Snider Inc.) discussed her firm’s experiences in redeveloping Brownfield properties, and most recently, with several EPA pilot projects. Ms. Snider used the Everett Brownfields Pilot Project as a Case Study to further identify issues regarding Brownfields, and in particular, redevelopment in the Puget Sound area. The Everett Pilot Project focuses on the redevelopment of a 280-acre parcel containing a closed municipal landfill and the former Simpson pulp mill. It is located in Everett, Washington, Snohomish Co., one of the fastest growing parts of the country. The landfill was

used up to the mid-1970's, and closed prior to current regulations. As with many of the old municipal landfills in this area, garbage was disposed in a natural low, on top of clays and silts of the meandering river valley. The City of Everett commissioned a study to define the marketability of the parcel, which was critical. In this part of the country, there is tremendous pressure to redevelop properties within an existing urban landscape, with a focus toward growth management (industrial properties redeveloped as industrial properties). The study confirmed this parcel as prime real estate: it is located adjacent to I-5; accessibility will be further improved by the transit system being developed for Puget Sound; it is near the downtown area; and it could address a demand for recreational use, wetlands and waterfront improvements. The City is now considering the site for potential office space, a wetland area, and a campus retail area.

With regard to this and similar sites, Ms. Snider emphasized that the City does not do the actual development. Rather the City has the responsibility *to promote and encourage redevelopment* to increase tax rolls, *while retaining the liability of environmental stewardship*, such as protection of the river front. The City's goal then is to sell the interior of the property for redevelopment *by others* who know how to bring a site to market. Therefore the City needs to *entitle* the property to bring it to that development point. Because there are uncertainties associated with landfill sites, the City and the regulators must identify the performance criteria to attract developers for the property: What will be required by the regulatory agencies to allow development of this parcel? What will be required for this site to ensure environmental protection? Identifying the *performance criteria* is key to proceeding to development. In addition, the design guidelines under development, presumptive remedy guidance, and the tool kits available through EPA, assist the State agencies and local governments in walking through this process.

Ms. Snider summarized the uncertainties that developers face, particularly for the redevelopment of municipal landfill sites. First, there is uncertainty with respect to the regulatory status of the site. Frequently, these sites stopped receiving waste prior to current landfill closure regulations and were grandfathered as existing, low priority sites for municipal management. Second, geotechnical and structural uncertainties, such as the settlement of waste, can have significant effects on site structures, utilities, and building systems. In addition, foundation systems may be constrained by requirements regarding ground-water management and gas control. Third, gas management within the facility, and along its perimeter, is frequently of concern to multiple regulators and is often an unfamiliar issue to many site cleanup regulators. Fourth, deed restrictions affect long-term management, monitoring, and liability of the site. Responsibility for site liabilities and monitoring frequently are split between new owners/developers and the municipality. Use restrictions are of critical importance to both the remedy and site value. Fifth, there are overall added costs to developing the site in comparison to the market value. Grant monies or tax breaks may be available.

Ron Terrel (Terrel Research; Professor Emeritus, Civil Engineering, U. of Washington) discussed the benefits of using MatCon (**M**odified **A**sphalt **T**echnology for Waste **C**ontainment), as an effective, durable landfill cover. There are five mechanisms that contribute to failure of typical asphalt pavements: fatigue, rutting, and in particular, thermal cracking, aging, and water sensitivity. Asphalt liquefies at 300E C, but becomes brittle under cold conditions. However, asphalt can be modified for certain properties desired for landfill covers. The key is to keep out water and air, which is largely

controlled by the void space (Note: a typical highway asphalt has a void space of 6-10%). Water can enter the void space, expand and contract, and damage the cover.

The key to the success of the MatCon cover is that it keeps air and water out. MatCon is a modified asphalt technology that has a permeability of 1×10^{-8} cm/s and exceeds the RCRA permeability standard of 1×10^{-7} cm/s. The patented MatCon liner design is comprised of three, 4-inch layers consisting of a leak detection layer (single size aggregates bound together with the MatCon binder) sandwiched between two layers of impermeable MatCon material. Whereas the top and bottom layers are solid and virtually voidless barriers, the central layer looks more like the inside of a popcorn ball and contains 20 to 25 percent void space. The detection layer of the liner can be divided into sections, using impermeable MatCon curbs or dividers. These sections allow for the insertion of leak detection pipes that can be used to detect water infiltration or leaks. MatCon is extremely durable and can bear significant loads with no impact (buildings, heavy equipment, etc.) Dr. Terrel cited one example where the surface was inspected after ten years of use; there was no degradation indicated.

MatCon is currently being evaluated at Dover Air Force Base in Dover, Delaware, as part of the SITE program. The surface includes some open-graded cells that serve as leak detection systems. The MatCon material will provide cover material at the Dover site; it will also be reused as a parking lot. For more information and product specifications on MatCon, please visit:

<http://www.wilderconstruction.com/matcon/index.htm>

Beth Gross (Geosyntec), a geotechnical engineer, discussed landfill reuse from a design perspective. Ms. Gross identified three issues related to landfill design: 1) cap designs should meet *reuse* objectives; 2) cap designs must meet *remedial* objectives (limiting percolation, gas emissions, and the potential for contact with the waste); and 3) landfill cap failures. Note however that considerations for reuse objectives and remediation may conflict. For example, a golf course constructed over a cap will require an irrigation system. However, irrigation will increase the percolation of water into the landfill, increasing leachate generation and landfill gas. The reuse plan must also consider issues associated with the isolated waste, such as gas emissions, settlement, and impact to slope stability. As more covers are constructed with synthetic geomembranes, we are seeing an increase in geomembrane tears and concerns with slope stability. We need to be aware of cap design and construction issues in order to reduce cap failures.

Case Study: Ms. Gross discussed the double composite liner system construction over an existing landfill in the town of Babylon, Long Island, New York in 1987. Large differential settlement was expected due to the varying waste types (organic matter, construction debris) and thickness. The differential settlement problem was minimized using Deep Dynamic Compaction, where a large weight was dropped repeatedly in a grid pattern over the landfill, effectively compacting the landfill waste. In addition, inclinometers were placed beneath the liner system to ensure that the integrity of the liner system would not be affected by settlement and that the liner system would drain properly. The inclinometer data recently indicated that there had been significant differential settlement over the past seven years, but that there was still positive drainage.

At the same site, a liner system for a lateral landfill expansion had been constructed over the side slopes of the old municipal landfill. The liner system on the side slope was reinforced with a geosynthetic

material instead of using deep dynamic compaction. A preload test was performed on the waste, based on the weight of a retail building built on the site, and the settlement rate was determined to be 2 feet during the 30-year design life of the landfill. However, the variation of waste properties and degradation of the waste was not considered in the settlement analysis, and 2 feet of settlement has already occurred within a 2-year time period. The building, built on concrete pilings, is now two feet higher than the surrounding asphalt. In addition, gas has been detected under the building and is accumulating under the gas-impermeable liner and around the pilings. *It is important to consider gas-barriers, any penetrations of the geomembrane, and settlement when designing for landfill reuse.*

Case Study: The City of Tucson has developed, or is considering reuse for, 21 pre-RCRA Subtitle D municipal landfill closed sites for recreational purposes including golf courses, baseball fields, and soccer fields. The cover systems for each of these landfills consist of 2-4 feet of silt and sand. The golf courses and soccer fields have irrigation systems installed within the cover systems. The city currently is conducting a study of the impact of the irrigation system on gas emissions and infiltration through the cap. There are no gas extraction systems in place. The City will be comparing these results to a landfill that is equipped with a gas extraction system.

Case Study: The McColl Superfund site in California, is a former industrial waste disposal facility. The site contained 22 unlined pits of petroleum waste sludge; disposal occurred during WWII. There were objectionable odors from the site and concerns for human health risks, so the site was covered with fill in the 1950's. Part of the site was later developed into a golf course, but was subsequently placed on the National Priority List (NPL) in the 1980s due to waste seeping onto the golf fairways. Final remedy for the site included source containment with a slurry wall, and a RCRA-equivalent cap with geograde reinforcement and a bio-barrier thick, vegetative cap. Soil remedies are not yet finalized. Ground water is being treated on site and discharged to ponds, meandering streams, and wetlands that have been designed as part of the golf course. More information on the McColl Superfund site can be found in the December 1998 issue of *Civil Engineering*, pp. 42-45.

Steve Dwyer (DOE - Sandia National Laboratory) discussed an ongoing study by the State of California Environmental Department and Sandia Laboratory, which is investigating existing closure technologies for landfills. The project involves a large-scale field demonstration comparing final landfill cover designs: four alternative cover designs and two conventional designs (a RCRA Subtitle 'D' Soil Cover and a RCRA Subtitle 'C' Compacted Clay Cover). The demonstration is intended to evaluate the various cover designs based on their respective water balance performance, ease of construction, and cost, for arid climates. For this project, there is more concern with water balance issues than other issues associated with landfills (i.e. differential settlement). So, design is monitored primarily for water balance; variables include percolation through the cover, soil moisture within the cover, runoff through collection galleries (gravity-fed and 300 ft. in length). As part of the research, actual field results will be compared to predictive numerical models. As an interested illustration, Mr. Dwyer showed an example of the clay barrier layer, installed under the minimum RCRA Subtitle C requirements, which showed extensive dessication cracking minutes after installation in the Albuquerque environment.

Of the cover profiles that were built, the Subtitle C cover is by far the most expensive. The Subtitle D

cover is the least expensive, but percolation rates are substantially higher than other alternatives. The alternative evapotranspiration cover is popular, inexpensive to build, and responds well to Southwest conditions.

Paul Shumann (DOE - Los Alamos National Laboratory) presented a different perspective on reuse, where property transfer (and redevelopment) is initially driven by federal statute, rather than the market. Similar to property transfers conducted under the base closure initiative, DOE is required to identify, remediate, and transfer targeted federal properties to the private sector under the mandate of Public Law 105-119, enacted by Congress in 1997. The statute has also dictated that target properties transfer by November 10, 2007.

The Los Alamos National Laboratory is similar to other DOE facilities in that it was purposefully located at a distance from existing communities, making redevelopment more of a challenge. The facility is currently surrounded by small communities, public forest service land, and Indian lands. DOE has identified 10 parcels, or 4,796 total acres, that meet the criteria for disposition to the general public. The statute has specified that the property will go to either Los Alamos County or be held by Department of Interior for the San Ildefonso Pueblo for preservation or economic development. Both the County and the Pueblo have submitted reuse options for the target parcels; Los Alamos has to consider all reuse proposed when considering site remediation, cost projections, and scheduling. DOE will be challenged to: 1) remediate and transfer a variety of properties, ranging from small and simple, to large and complex within a set time frame; 2) develop cost estimates and proposed schedules for the characterization and remediation of over 200 RCRA sites; and 3) assure that one remedial alternative will restore the properties for traditional cultural uses.

DOE's approach to Congress' mandate has been to: 1) re-orient the risk based decision analysis from a focus on a single potential release site to an integrated risk analysis across an entire parcel; 2) include quantified uncertainties, based on incomplete data, in the cost estimates; 3) initiate a dialogue with tribal members of San Ildefonso Pueblo to develop a mutually acceptable approach to assessing risk associated with traditional cultural land uses.

The results to date are that DOE has: 1) developed defensible cost estimates and proposed schedules for remedial action; 2) submitted the Environmental Restoration Report to Congress in August 1999; 3) taken a proactive stance and initiated dialogues with potential land recipients to identify and address questions and concerns; and 4) initiated a formal Environmental Restoration Project baseline activity in FY00 to work on a Native American risk assessment scenario and conduct sampling of environmental media and biota of cultural significance.

Lisa Boynton (EPA OERR) provided an overview of the regulatory papers currently being developed through the Superfund Redevelopment Initiative. On July 23, 1999, EPA Administrator Carol Browner, announced the Superfund Redevelopment Initiative at the Avtecs Fibers Superfund site. The initiative is a nationally coordinated effort to facilitate the return of Superfund sites to productive use. EPA and its partners are working together to determine anticipated future landfill uses so that we can select and implement protective remedies consistent with planned land reuse. EPA is building on the Brownfields experience, under the Superfund Redevelopment Initiative, to provide technical, financial, and other types

of assistance to communities, including a pilot program to provide technical and financial assistance to local governments.

The Superfund Redevelopment Initiative (see the website reference below) is based on several operating principles: that the continued protection of human health and the environment will not be compromised; that responsible parties will not be relieved from their obligation to clean up sites and bear those costs; that reuse is not to prolong the cleanup (when stakeholders agree to reuse, cleanup can actually proceed more quickly and there may be fewer obstacles to slow cleanup). The Initiative focuses on those sites in the earlier stages of cleanup, but also supports sites with cleanup underway with the understanding that EPA will not reopen Records of Decision (RODs) or enforcement orders.

To promote reuse under the Initiative, EPA has developed a series of guidance documents which can be accessed through our Superfund website (below). The Agency is also developing guidance and training for Regional Project Managers (RPMs), community involvement coordinators, other regional staff, and private stakeholders. The Agency is funding a peer match program through the International City/County Management Association (ICMA) to enable local governments to share their experiences and successful practices in projecting future land use and doing cleanup consistent with that use.

Currently, EPA has ten pilot projects, one in each Region; an additional 40 sites will be selected soon through an open proposal process. EPA will provide up to \$100,000 in financial assistance to the local governments at each of the pilot sites. This assistance can be in the form of a grant, or access to a facilitation service, or an expert provided through an IPA, or through access to the peer match program with ICMA. For each pilot, EPA may fund the development of reuse assessments or public outreach to help determine future reuse. The call for the next round of pilots (40 additional sites) will be noticed in the Federal Register in early November, 1999; proposals will be due January 2000. Sites selected through the open proposal process will be announced in March 2000.

Ms. Boynton concluded with a slide of the former Anaconda Smelter Site in Montana (before), and the current property under recreational reuse (after). For more information on the Superfund Redevelopment Initiative, please visit <http://www.epa.gov/superfund/programs/recycle/index.htm>

OPEN DISCUSSION QUESTION AND ANSWER PERIOD³

What are the greatest impediments to the redevelopment of Superfund sites?

- There are many hurdles to the redevelopment of landfills. The institutional and regulatory issues are far more complex than the technology issues. There are many different parties and many cultural differences in how the regulatory agencies and real estate developers work. A big challenge in redevelopment is

³ Responses to the questions in this section are noted as “bullets.” Each bullet represents the perspective and experience of a particular speaker, in response to the question posed or comments by the other panelists.

integrating the different processes: the Superfund process, the real estate development process, and the city EIR process. Integrating these processes is difficult, including the monumental legal issues that accompany that integration. Keep in mind that the entire redevelopment process can take longer than you might expect.

Was your management supportive of the process?

- Agency management has been very supportive. There was a need to expedite our process to meet the accelerated real estate process.
- There is a tension between developing a site around increased environmental protectiveness and development primarily for reuse. Development of the site will depend on who has the money to develop the site, and who is *appropriate* for a certain development. The PRP for the site usually is not in the development business. Getting the property to a point of development depends on a mixture of marketability and complex partnerships between multiple entities; therein lies the complexity of developing a site.
- You have a difficult “chicken and egg” problem. You need a developer, but you don’t know what you want to do with the site. And not all developers are the same. For example, a golf course developer is not the right choice to develop a shopping center. It is important to put things in the proper order: 1) Is there a market for the site? 2) Engage the community; 3) Coordinate the technical issues. You then have a game plan of how you want to use the site and can then search out a developer. If you involve the developer too early in the process, you may doom your site to a particular use which may not be politically or technically feasible.

Another issue to consider is that the time horizon for many of the Superfund sites goes far beyond the patience of most developers. In marketing real estate, we like to deal with mainstream developers, who can borrow money at discounted rates (8-9%). “Brownfields” developers often charge ~35% so the projects must turn around very quickly to be economically feasible. Superfund projects don’t move that quickly. So we try to project out to what the market will be; set time horizons to that point; establish realistic objectives; and get the community buy-in for something achievable. *One of the biggest dangers for the Agency is building unrealistic expectations about the redevelopment program and ending up with politically correct uses that fulfill a political need, but not a market need.* When it doesn’t work, the Agency will be blamed.

- The uses for some sites are usually very obvious; for example, commercial areas will be reused as commercial. This is a trend that you can plan for in many urban settings, where the market is somewhat established. Redevelopment of rural areas may be much more of a challenge because land values are lower and competitive properties are available. However, there are many properties that fall between these two endpoints where land use is in doubt, reuse is not clear. In these cases, a vision for reuse is needed. The vision can involve public facilities, highway planning, city planning, and local redevelopment. The Industri-Plex site in Woburn, MA provides an example of this where all these entities worked together, the regulators were brought into the process, and soon other interests were sparked. The momentum “snow-balled” and the site eventually developed into a large mixed-use development.

What about the Operating and Maintenance (O & M) and liability aspects of redevelopment?

- Region 9 used a consent decree to address O & M and liability issues. A consent decree is more enforceable than a Prospective Purchaser Agreement (PPA), and can accommodate multiple parties. One of our challenges has been: What happens if the developer disappears or conveys the property to another party? Our concern is whether there will be a long-term commitment to O & M. What has worked for the OII site is that there the City has been a strong supporter of the project, and a participating stakeholder. The City of Monterey will most likely take over the responsibility for long-term O & M.
- For the Everett project, a consent decree is being negotiated whereby the city is accepting long-term liability for perimeter issues, such as downgradient ground-water monitoring, gas control, and leachate collection. When the consent decree is signed, the new owners will take responsibility for O & M aspects for the site's interior, such as the site pavement, buildings on the site, utilities, etc. The city can then pass on construction requirements, such as installation of the gas management and gas controls systems, to the future owners. The City will still retain responsibility for the perimeter systems. The consent decree also provides for the addition of any future owners.
- The PRPs have to build into the agreement the right of first refusal so that corporations can buy back real estate at a later date and protect themselves from mismanagement.

What significance does location and financial viability have with respect to the redevelopment process?

- For Superfund sites, redevelopment almost never makes financial sense. However, the issue is not always financial for the PRP. Many PRPs are consumer-product companies, utility companies, and others with a brand name they want to protect. Or they may have a name or reputation in the community that they want to preserve; therefore *public relations* is very important. If the PRP can secure creative reuse benefits for the community, it puts the PRP in a positive light. The question of finance may be secondary to resolution of the problem.
- DOE sites provide another example where cleanup never makes financial sense. When multi-cultural stakeholders and other interested parties are involved, there may be issues completely different from cost and property valuation. For example, we have parties with the County that are interested in economic development. On the other hand, the Pueblo is looking at the available properties as a "sense of place," where the land is considered for ceremonial use, for use in their art, and for subsistence; in ways that are difficult to evaluate in economic terms. This type of reuse can also be difficult to translate to remediation and clean-up goals. We will have to develop a risk assessment approach that considers these different applications for reuse. However, at this point, the stakeholders are not in favor of leaving any contamination in place. These will be the challenges as we proceed to remedy.

Does anyone know a site where redevelopment was tried and failed? What was the main factor that led to that failure?

- There have been some failures at recreational sites where engineering factors were not considered; for

example, where ball fields were built on top of landfills. When the landfill started to settle, there were tripping hazards and so the ball fields had to be closed. There is also a Superfund site in Indiana where the soil was remediated for lead in order to redevelop the site for commercial development. The developer did a lot of the work to remediate the site. However, disagreement on appropriate clean-up levels from the State and Federal regulators resulted in significant delays, and forced the developer to abandon the project.

- *Changed expectations* are more common than failures. There may not be a *market* for the expected view of the site, so other goals take priority. As goals change, expectations change, then reuse. Often the expected view of the site may not be the best for reuse of the site. This again leads to a changed expectation of site use. This is not necessarily a failure, but rather a change of focus.

- With respect to marketability, EPA is not in the real estate business. One of the things that we have done at our site is to form close collaborative partnerships with the city, developers and PRPs and given them the flexibility to design the site so that it will make sense from a market and business perspective. This is a key element.

- Many PRPs are also not in the development business, and so there is this business of “intermediaries” who are doing a good job of bringing the property to market and selling it.

- From a developer’s perspective, hundreds of deals fail; there are many failure mechanisms. *There is an adage in real estate “Time kills deals.”*

What regulatory issues have been most problematic in trying to get a site redeveloped?

- Regulatory issues have been our biggest problem. There is real confusion in redeveloping one of these old landfill sites, and where it fits in the regulatory scheme. When an old site is selected for redevelopment, the site moves from Solid Waste to Toxic Waste jurisdiction for clean-up (this has been the case with some of our states). However, the hazardous waste regulatory staff may be unfamiliar with landfill issues such as gas accumulation and waste settlement, and may not understand the presumptive remedy approach for landfills. The PRP must suddenly deal with regulations that were not on the table before. They are now spending more money on compliance instead of redevelopment, to meet “new” regulatory requirements without any certainty that they will attract a developer. We need EPA, state entities, and industry to develop more literature, cleanup guidelines, and tools that are geared toward redevelopment which will give the regulators a comfort level in proceeding to development.

- First, many of our regulatory processes are not designed to deal with the flexibility required in property redevelopment. We have many different parties working together with many different regulatory systems trying to achieve alignment on common objectives. The second issue is liability. EPA is making use of consent decrees that make use of covenants not to sue. They are an important part of the redevelopment “tool box.”

- Several private developers at Superfund sites have said that they would not move forward without a Prospective Purchaser Agreement (PPA). An important component of the PPA is a covenant not to sue. One of the stumbling blocks is that it takes a long time to get the paperwork processed through EPA and Department of Justice (DOJ). Developers have stated that DOJ is not as open and flexible as EPA; this is seen as a critical stumbling block. The lenders want to see the PPA, although it is not necessarily that protective. This issue can be “deal killer.”

Is there any guidance being developed within EPA that discusses liability, O&M, and the complexity of the regulations?

- The current OERR fact sheet is very broad, but there are sites that have creative arrangements with the PRPs with respect to O & M and institutional controls. If there is a topic area that is creating a particular difficulty, EPA OERR can gather information and develop more specific guidance as needed. Please contact Andrea McLaughlin, EPA OERR, with any recommendations.

- There should be more coordination between regulatory agencies involved in different aspects of a site project. For example, a developer was interested in a Superfund site redevelopment in Philadelphia, which included a wetland. The Army Corps involvement was needed to issue a permit for the wetlands; however, they did not want to commit to the work effort until the developer was committed to the project. At the same time, EPA decided to pursue an additional \$400,000 from the prospective purchaser, and sued. The project was delayed a year. The PRP, taking the cue from EPA, sued the prospective purchaser to increase the price, resulting in another delay. The resulting 2-year delay to get \$400,000 for the Trust Fund resulted in delaying a \$250 million port development project.

- Part of the problem is that the legal staff at EPA is always interested in obtaining a financial benefit for the Agency; however, financial benefit to EPA is not always the driving force in redevelopment. There are other benefits, especially to the community, that are more important.

- All these questions lead to the sequencing issue of : when do you get *regulatory certainty*; and when does a developer become involved in the redevelopment of the site? Many of the sites have PRPs, but the PRP is not the developer; it is also not the responsibility of the Municipality to put together a development plan. We need certainty before a developer will get involved. Developers will not commit to developing a site unless they have a covenant not to sue, or until they have certainty on their share of the liability. However, this can be a problem for the regulators and attorneys who want to see design specifications and performance requirements for a site before negotiating a covenant not to sue. This is difficult “chicken and egg” scenario.

- At one site, EPA is using the draft consent decree and scope of work to incorporate all these things together. Rather than using a PPA, covenants not to sue are being included in the draft consent decree. The scope of work is being developed simultaneously with the draft covenant not to sue, and this seems to give EPA and the developer’s attorneys the assurances they want.

- We don’t use covenants not to sue with EPA. They take too long, and as previously said, time kills deals. We try to put the documentation (deal structure) together that gives comfort to the person buying or

leasing the property. We have been able to do this successfully. At a site in Washington, the developer and the lender were initially insisting upon a covenant, but we took the time to talk them out of it. We were concerned that the covenant not to sue would take a year to obtain, and by that time the market would be lost. It has been our experience that covenants are unnecessary if you've done your homework.

Are there any unique reuse issues at sites for RPMs to consider?

- Some sites have been converted to residential reuse, but this requires complete removal of contaminants or “in place” disposal. There have also been some sites converted to agricultural reuse, where remediated ground water was used for irrigation.
- By using an asphalt mix surface for a cover, reuse options for a site are increased. These covers are quite durable and can bear significant loads allowing, for example, the construction of a waste processing facility on top of the cover.
- At the Ascon Landfill in Los Angeles, 50' x 50' pads, with 18-inch thick asphalt covers, were constructed over a 100' depth landfill to create work surfaces that would support large cranes and buildings. The pads were tied together with steel ties; Steel sleeves were built to allow for periodic adjustment for settlement. The special mix of asphalt was prepared onsite under specific temperatures and humidity to produce the desired mixture. At the Ohio River Park near Pittsburgh, the developers raised the grade level 3-10' on the industrial landfill by bringing in clean fill. Utilities, foundations, and other structures to support reuse were installed in the fill. There are creative things to be done, but it must be done in an area where the economics support it.
- Cultural reuse can be a unique use of landfill sites. Be aware that when historical or archeological sites are suspected, special approval for redevelopment or remediation may be required. In many cases, a state historic preservation officer and Tribe representative should be consulted. There are laws related to repatriation of Native American graves and the finding of cultural artifacts.

Are there concerns about landfill gas and recreation uses? How was this issue resolved?

- At the Ohio River Park site, a passive gas collection system was installed. The remedy consisted of RCRA type caps over areas with concentrated waste and erosion caps over other areas. The passive gas collection systems consisted of a series of trenches that were backfilled with gravel and perforated pipe. These were overlain with compacted soil that was covered by an HDPE synthetic liner. The volume of gas at the site is low and does not appear to be a problem.

Ecological, recreational, and industrial uses have different design issues. What unique design issues have you encountered?

- At recreational soccer fields, a geomembrane can be used to protect the turf and to control gas leaks, thereby minimizing flash fire hazards. Also, in order to direct the gas away from the reuse area you can install the gas collection system horizontally. If the gradient of the cover system is too great to construct

a ballfield on it, you can design the gradient of the drainage cover underneath the landfill with a slope greater than the surface layer so as to allow for better drainage and a better playing surface. This was successful at an old mine tailings site. In England, where there are more land constraints, there are numerous conferences on engineering considerations for commercial landfill redevelopment. Design considerations include convex foundations under buildings, so that gas does not pool underneath the structure, and putting geomembranes within building foundations as gas barriers, in case of cracks.

- You have to design to the regulations, but you also have to design to the market. The solutions that please the Agency may not please the marketplace. For example, we had a situation at a site where asbestos was removed when it should have remained in place. We need to coordinate the design process with market acceptance.

- Geosyntec sometimes constructs a crawl space beneath the structure so that areas under the buildings can be inspected. For municipal waste sites, we adjust the boot around the piling so that it will move down with the waste. With a crawl space, we can physically inspect the geomembrane and see what is going on beneath the building. This design feature is quite popular with our California office.

At the OIA landfill, there is a very thick soil layer under the cover allows methane accumulation to biodegrade as it rises through the soil column. This has been confirmed. There are also options when dealing with settlement. We can compress the waste through *deep dynamic compaction*, install a reinforce layer beneath the liner system, stabilize the surface of the waste with wood chips, or design a structure to accommodate the settlement. When there is settlement, percolation should also be considered.

- One panelist discussed his skepticism regarding the redevelopment of old landfills sites, because many do not have EPA involvement. Regulatory agencies at the state and county level may not have the manpower or technical capabilities to inspect the facilities. There have been projects that looked good on paper, but did not work out. In one example, a new development was built adjacent to an old landfill. Building was going to stop before the landfill boundary. This did not happen, and the development extended onto the landfill surface. Foundations have cracked, waste is being drained across front yards; it is not a good situation.

- There are maintenance issue for landfills, but redevelopment can be helpful because the site is more likely to be looked after. Keep in mind that institutional controls have not always worked.

- From the developer's perspective and experience, institutional controls will not always work. It is better to proceed with the development, at the risk that at some point institutional controls might fail, than to do nothing.

Is there broad-based guidance that tells you when landfill reuse is a bad idea?

- If the site is a very deep, or contains fresh fill, or unknown content, and has not been compacted, then you may want to wait to redevelop.

- EPA's 1993 guidance on presumptive remedy states that there should be no residential reuse on landfills.

- We need to look at the reliability of institutional controls; more guidance is needed in this area.

- EPA is currently developing a guidance manual on the different types of institutional controls. The manual approaches institutional controls from a legal point of view. A smaller, 15-page synopsis will be available within this next year. It is also important that institutional controls be in place before a Record of Decision is signed.

Reuse better ensures that the responsible party will follow through on institutional controls. This may not be the case if a site is fenced and not put to use.

Are sites characterized adequately to facilitate landfill reuse or are there data gaps?

- Potentially, data gaps can be a problem. In the western states, municipal landfills have unknown, or hazardous wastes; it is not advisable to develop them. The landfills have not been characterized, and probably won't be characterized in the future.

- Where there is characterization, it is usually an environmental characterization to determine the potential for release. However, the RI/FS process does not give us the kind of data to predict settlement and the structural geotechnical capacity of landfills. We would like to see more historical information on settlement of municipal waste. Our biggest issue is settlement; every site is different. What can we expect for draw-down on piers? What kind of settlement can we expect as waste decomposes?

- Be aware that hydrogenesis can be an issue in arid climates. At Los Alamos, a parking lot was paved many years ago with conventional pavement. Despite the dry climate, hydrogenesis (water generated from the atmosphere) occurred and the site retained water under the cover, causing sagging and cracking. Hydrogenesis will also create water hazards under a geomembrane at landfills sited in arid climates. Venting allows moisture to dissipate; installing a porous membrane will also allow the waste to "breathe".

What happens to the operating and maintenance mechanisms at the sites with respect to future development?

- After fifteen years of operation of a commercial facility, settlement at a landfill can force you to revisit the site. But you must also consider institutional controls; the regulatory process must stay intact to ensure that operation and maintenance is properly addressed.

- For many sites, there will be a need for maintenance well beyond their 30 year life span. There has not been much thought given to what maintenance (long-term) will be needed beyond the expected 30-year span.

What are the factors that determine whether a site should be selected for redevelopment?

- The marketplace and the context of the site will determine whether a site is a good candidate for reuse, not EPA. The regulatory community must have the flexibility to allow redevelopment, but understand when a site is not a good candidate for reuse.

- In California, we have the opposite experience. The cities and communities are coming to EPA to redevelop sites. Again, it is not EPA's role to redevelop, but rather to be receptive to the community's desires.

- We have the reverse situation for those DOE and DOD sites targeted for redevelopment by Congress. We have to explain why a site may not be good for redevelopment as some may not be economically viable.

What is the public perspective on redevelopment?

- It depends on the context. For example, the Puget Sound community-at-large supports redevelopment, particularly as industrial sites are developed for industrial reuse. However, the people that live closer to a specific site see it differently, being more interested in specific reuse and not so willing to give up their neighborhood "open space" for development. The Agency may have a preconceived notion of what the community wants, but the public needs to be involved in both the large (regional) and small scale (neighborhood) planning.

- In residential areas, people are more sensitive to risk, either trusting of the process or wanting zero risk. In commercial areas, liability is a concern: What is the hidden liability? What are the hidden costs?

- In our sites in California, people are more concerned with *what type* of redevelopment will occur rather than *if* redevelopment will occur. People are aligned that beneficial reuse is a good thing, but what kind of reuse is of interest.

- At DOE and DOD sites, local land reuse committees are consulted early in the site remediation process. It is important to bring interested parties early into the remedial process and begin discussions as to what the best use of the site will be. Bring in discussion about reuse at the early site investigation stage.

Are there financial or insurance incentives available in the redevelopment process? (See Attachment B)

- There are products that are designed to protect people who are redeveloping properties. There are people that purchase hazardous waste properties for a certain amount, then remediate the properties under cost. The properties then are worth more after clean-up. They can purchase "stop loss insurance" and redevelopment packages which will set a limit on their exposure. Third-party liability insurance protects the lender in the event that there is a default on the loan (environmental insurance for defaulted property).

How do you design around remediation features that must stay on the site?

- Through site reconsolidation and regrading. Major features such as leachate control, and thermal oxidizer units can be hidden by raising the ground level around them. Storm water runoff, access, rights of way are design features that must be considered differently.

Are the specifications for MatCon available?

- Product specifications are available at the MatCon link at the following site:

<http://www.wilderconstruction.com/matcon/index.htm>

How do you design around utilities in a landfill?

- We cluster utilities and place them in corridors (“utili-dors”). Utilities can be place in “boxes” that are pile-supported. Our major concern is settlement, but most remedial controls for a landfill are located along the perimeter: (i.e. ground water monitoring, gas migration control, and leachate control). As much as possible, cluster main utilities in areas of the landfill where you expect the least amount of settlement. Design the remedial components into the redevelopment components, for any interior structures.

- Keep in mind that utility corridors can create conduits for migration of liquids or gases created within landfills.

- Utilities may also be placed in a clean fill above the waste containment system, or in specially constructed corridors. You can also move waste around within a site, creating multiple containment systems, with areas of clean fill between them, instead of one large one. Also, look at utilities that will be accessed most often and place these in trenches with clean fill. Gas barriers can be installed around utility boxes or access points to address health and safety (closed space) concerns; institutional controls can also be used to address access issues.

- You should also consider how landfill materials (i.e. concrete or steel pilings) will react with landfill waste and leachate.

What mechanisms are available to ensure protection of the environment at these sites when present uses are no longer valid and the property is once again being considered for redevelopment?

- There was no input for this question. This question may identify a need for future guidance.

ADJOURNMENT

Frank Vavra adjourned the discussions by thanking all the panelist and participants and announcing that the roundtable discussions will result in a paper that will be made available to all Forum members and interested parties. Additional information can be obtained by contacting the Engineering Forum Co-chairs: JoAnn Cola (Region 9) (415) 744-2238; Camille Hueni (Region 6) (214) 665-2231; Steve Kinser (Region 7) (913) 551-7728.

Attachment A
Contact Information for Landfill Redevelopment Roundtable Participants

REGULATORY

Lisa Boynton
1200 Pennsylvania Avenue, NW
Washington, DC 20460
703/603-9052
Fax: 703/603-9104
boynton.lisa@epa.gov

Andrea McLaughlin
1200 Pennsylvania Avenue, NW
Washington, DC 20460
703/603-8793
Fax: 703/603-9104
mclaughlin.andrea@epa.gov

Sidney Wolf
EMS, Inc.
8601 Georgia Ave., Suite 500
Silver Spring, MD 20910
301/545-5015
Fax: 301/589-8487
swolf@emsus.com

Joe King
Marasco Newton Group
2425 Wilson Blvd., 4th Floor
Arlington, VA 22201
703/247-4704
Fax: 703/526-9826
jking@marasconewton.com

Russell Mechem
U.S. EPA
75 Hawthorne St. (SFD-7-4)
San Francisco, CA 94105
415/744-2401
Fax: 415/744-1917
mechem.russell@epa.gov

SITE DEVELOPMENT

David J. Daddario, P.E.
Senior Vice President
North American Realty Advisory Services
100 Park Avenue
New York, New York 10017
212/883-0500 -Ext. 545
Fax: 212/883-0520
daddario@northamericanrealty.com

Kathryn A. Snider.
Floyd and Snider Inc.
83 South King Street
Suite 614
Seattle, Washington 98104
206/292-2078
Fax: 206/682-7867
Kates@floyd-snider.com

Paul Schumann
Los Alamos National Laboratory
Mail Stop: M992
P.O. Box 1663
Los Alamos, New Mexico 87545
505/667-5840
Fax: 505/665-4747
schumannp@lanl.gov

TECHNICAL

Steve Dwyer
Sandia National Laboratories
Mail Stop: 0719
P.O. Box 5800
Albuquerque, New Mexico 87185
505/844-0595
Fax: 505/844-0543
sfdwyer@sandia.gov

Dr. Ron Terrel
9703 241st Place SW
Edmonds, WA 98020
206/542-9223
Fax: 206/542-6159
rterrel@u.washington.edu

Beth Gross
Geosyntec
1004 E. 43rd St.
Austin, TX 78751
512/451-4003
Fax: 512/322-3953
bethg@geosyntec.com

Attachment B

Information on insurance options:

An *owner* can acquire Brownfield insurance for the following:

Bodily Injury

Property Damages

Cleanup Costs

Defense Expenses

Contract Damages

Remediation Costs Overruns

Business Interruption

Development Soft Costs

Property Value Diminution

A *creditor* might acquire insurance for the following:

Reimbursement for Environmental Damages

Reimbursement for Collateral Loss

Source: Richard P. Craig, Kemper Environmental, San Francisco, Northwestern Regional Manager,
475 Sansome St., San Francisco, CA 94111, 415-616-6794, rcraig@kemperinsurance.com

Attachment C
Participants' Biographies

Lisa Boynton

US Environmental Protection Agency, Washington, DC

Information not available.

David J. Daddario

North American Realty Advisory Services, New York, New York

Mr. Daddario is Senior Vice President of North American Realty Advisory Services (NARAS) and has more than 25 years of experience in the planning, packaging, and marketing of land and building assets, many involving environmental remediation programs. He and his company have been involved in numerous redevelopment efforts at Superfund sites and have been particularly involved in the brownfield revitalization initiative. Mr. Daddario supervises project teams in the adaptive-reuse of industrial, retail, office, residential, and waterfront assets, and provides assistance to PRPs or site owners in their attempts to develop and market difficult properties. He has served as Project Director for the adaptive-reuse of DuPont's former Ammunition-Manufacturing Plant in Bridgeport/Stratford, CT; the reutilization program for Former Manufactured Gas Plant (MGP) Site in Racine, WI; the redevelopment of Bethlehem Steel's Facility in Vernon, CA; revitalization of former utility site in the metropolitan New York area; and the reutilization of AT&T's Hawthorne Works Facility in Chicago, IL. Mr. Daddario is a professional engineer and a specialist in strategic marketing.

Stephen F. Dwyer, P.E.

Sandia National Laboratory, Albuquerque, New Mexico

Mr. Dwyer is a Principal Investigator for the Alternative Landfill Cover Demonstration Project. The project demonstrates alternative landfill cover components and systems to provide long-term containment of waste in arid and semi-arid environments. Mr. Dwyer designed and installed six separate landfill covers and associated instrumentation and data acquisition systems. He is involved with the EPA, DOE, and myriad regulatory representatives from Western States, industry experts, and the Western Governors Association/DOIT Committee. Mr. Dwyer also designed an alternative landfill cover system for a mixed waste landfill. His areas of specialization include landfills and landfill closures, civil, structural, and environmental engineering design and analysis, and testing and data acquisition.

Beth A. Gross, P.E.

GeoSyntec Consultants, Austin, Texas

Beth Gross is a geotechnical engineer with GeoSyntec Consultants in Austin, Texas. She has thirteen years of experience in design, construction, and closure of municipal, industrial, and hazardous waste landfills. A number of these sites have included innovative liner and cover system designs. Ms. Gross has also worked extensively in a contract research capacity for the U.S. Environmental Protection Agency (EPA) in the development of guidelines for the design and construction of double liners and leak detection systems at hazardous waste facilities, the performance evaluation of liner systems used

at landfills, and the development of design guidance for landfill final cover systems. Currently, she is the lead author of the EPA report "Waste Containment Systems: Problems and Lessons Learned" and co-author of "Landfill Final Cover Guidance Document" and "Summary of Data Collected on Field Performance of Double-Lined Waste Containment Facilities". These reports will be published by EPA next year.

Joe King

Marasco Newton Group, Arlington, Virginia

Mr. King earned a Bachelors of Science in Physics from Mary Washington College and a Master of Arts in History from George Mason University. He is currently a project manager with Marasco Newton Group, which he joined in 1998. Mr King is coordinating the development of EPA's Technical Guidance for RCRA/CERCLA Landfill Caps and is contributing to the development of guides for designing remedies for reuse. He also provides technical and economic research support to EPA's Superfund Redevelopment Initiative, which is supporting the reuse of hazardous waste sites. Prior to joining Marasco Newton Group, Mr. King managed and conducted investigations of environmental insurance claims on behalf of Lloyds of London, Commercial Union, General Reinsurance, and other insurance carriers for Murphy & Maconachy, Inc., a private investigative firm. During his three years with Murphy & Maconachy, Mr. King was responsible for locating and interviewing witnesses and conducting research on technical manufacturing, environmental, and waste disposal practices to support negotiated settlements and legal defenses of insurance claims. Particular assignments included investigations of the chemical and electrical manufacturing industry's use and control of PCBs, TCE, beryllium, and other regulated toxic substances. Before joining Murphy & Maconachy, Mr. King provided logistical support and conducted technical research on the Trident Submarine Program as a systems engineer with American Systems Corporation.

Andrea McLaughlin

US Environmental Protection Agency, Washington, DC

Andrea McLaughlin is an Environmental Protection Specialist with the Environmental Protection Agency's Office of Emergency and Remedial Response. She has been with the Agency since 1988, and works on landfill issues, including reuse under the Superfund Redevelopment Initiative.

F. Russell Mechem II

US Environmental Protection Agency, Region 9, San Francisco, California

Russell Mechem is currently a project manager for USEPA, Region 9 in the Superfund Division, having first joined EPA in 1983. He is the project manager for the *Operating Industries Inc. (OII)* landfill site, which is one of the largest and most complex Superfund "mega-sites" in the United States. While working on the site, he has been involved in a myriad of project management activities, including construction oversight, groundwater and seismic investigations, and complex enforcement negotiations relating to a natural attenuation groundwater remedy for the site. A strong advocate for EPA's administrative reforms, he has also spearheaded several innovative initiatives related to the negotiated site selection for a controversial

landfill gas treatment system at OII and the *Brownfields Redevelopment Initiative* for the OII North Parcel.

In addition to his work at EPA, Russell has extensive international experience, particularly in Asia and the Pacific Rim. Transferring overseas from EPA in 1986, Russell spent eight years as the Director of the Division of Environmental Quality (DEQ) for the Commonwealth of the Northern Marianas Islands in Saipan (Micronesia) where he managed the DEQ office; directed many EPA-funded environmental management programs; coordinated numerous groundwater and integrated waste management projects; and managed a variety of international initiatives and diplomatic negotiations related to environmentally sound and sustainable economic development in the Pacific Rim.

Paul Schumann

Los Alamos National Laboratory, Los Alamos, New Mexico

Dr. Schumann is a Technical Staff Member at Los Alamos National Laboratory (LANL), Los Alamos, NM. Currently he works with LANL's Environmental Restoration Project as Team Leader for Communications and Outreach, and previously he worked with LANL's Waste Management Program. He is responsible for coordinating LANL's compliance with the LANL mixed waste Site Treatment Plan, enforced by a Federal Facility Compliance Order issued by the State of New Mexico, as well as for inspection support and follow-up, and negotiation and implementation of other compliance orders and agreements with the State of New Mexico and the US EPA related to the Resource Conservation and Recovery Act (RCRA) and associated state law.

Previously he worked for the USDOE as a site ESH Branch Chief, and for EPA Headquarters in both its RCRA Enforcement and CERCLA programs, providing technical assistance to site cleanups as well as participating in the development of the National Contingency Plan and several RCRA regulations for closure, corrective action, and other key programs. He also worked for several private consulting firms. Dr. Schumann holds an MS in Biology from the University of Nevada, a Doctor of Environmental Science and Engineering from UCLA, and was an NRC Fellow at the National Academy of Sciences.

Kate Snider

Floyd & Snider Inc., Seattle, Washington

Ms. Snider is a professional civil engineer and registered landscape architect with 15 years of experience in site engineering and site cleanup. Ms. Snider's strengths and reputation are in management of complex project teams, agency negotiations, and strategy development for cost-effective remedial design coupled with design for future redevelopment. During the last several years, Ms. Snider has filled an integral role in many of the precedent-setting "Brownfields" projects in the Pacific Northwest. She has significant skills in facilitating diverse or multi-jurisdictional teams to reach solutions optimizing group objectives. Ms. Snider has been one of the area leaders in developing and implementing area-wide solutions to contamination management, both in upland and aquatic environments.

Ronald L. Terrel

University of Washington, Seattle, Washington

Dr. Ron Terrel is Professor Emeritus of Civil Engineering, University of Washington, Seattle, having taken early retirement in 1985. During the past 15 years he has conducted research and consulted in his field of construction materials, including asphalt, concrete, pavements, and innovative applications of waste materials, modifiers, and recycling of pavements. Currently he is active in implementing a patented system for landfill caps and liners that utilizes modified asphalt.

Dr. Terrel holds BSCE and MSCE degrees from Purdue University and his PhD from the University of California, Berkeley. He is active in organizations such as the American Society of Testing and Materials, Transportation Research Board, American Society of Civil Engineers, and Association of Asphalt Paving Technologists. In his field, Ron has received awards, patents, and has published more than 150 technical papers and reports.

Sidney H. Wolf

Environmental Management Support, Inc., Silver Spring, Maryland

Sid Wolf is a senior economist and project manager with Environmental Management Support, Inc. of Silver Spring, Maryland, a suburb of Washington, DC. For the past 20 years, he has supported EPA headquarters and regional offices on a variety of managerial and analytical projects involving hazardous waste, water pollution control, and air programs. His experience includes resource and industrial economics, regulatory impact evaluations, benefit/cost analyses, modeling, risk management, and environmental policy. Over the past two years, Mr. Wolf has been manager and principal investigator on several EMS projects to evaluate the benefits and costs of the Superfund program, and to support the Superfund Site Redevelopment Initiative. The benefit/cost studies include efforts to estimate the impacts of Superfund response actions on human health, ecological resources, and property values, and assistance on the development of the forthcoming revised guidance on cost analysis for Feasibility Studies. Previously, he was project manager and principal author of *Cleaning Up the Nation's Waste Sites: Markets and Technology Trends*, a landmark study of the U.S. market for hazardous waste remediation technologies.

His work on the Superfund Site Redevelopment Initiative includes case studies on the cleanup and redevelopment of ten Superfund sites; an evaluation of financing methods available for redeveloping remediated sites; the paper *Property Values, Stigma, and Superfund*, which examines the pattern of recovery of property values after remediation of a Superfund site; investigation of the feasibility of a computerized national location and notification service for hazardous waste left on-site; evaluation of redevelopment issues at specific sites; and the development of guidebooks on methods for developing site reuse plans and remedial designs that are flexible enough to safely accommodate a variety of potential commercial, industrial, recreational, ecological, or public uses.

